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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/911,408

07/25/2001

Kenji Inage

110199

4088

25944

7590

10/08/2003

OLIFF & BERRIDGE, PLC  
P.O. BOX 19928  
ALEXANDRIA, VA 22320

EXAMINER

MILLER, BRIAN E

ART UNIT

PAPER NUMBER

2652

DATE MAILED: 10/08/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/911,408

Applicant(s)

INAGE ET AL.

Examiner

Brian E. Miller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 6/30/03.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2-5, 7-10, 12-15, 17-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2-5, 7-10, 12-15, 17-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |                                                                                              |                                                                             |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

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Claims 2-5, 7-10, 12-15, 17-20 are now pending.

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 103***

2. Claims 2-5, 7-10, 12-15, 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamoto et al. (U.S.P. 5,936,810) in view of Gill (U.S.P. 6,538,859).

As to claims 2, 7, 12 and 17, Nakamoto teaches a magnetoresistive device in Fig. 1 comprising a magnetoresistive element 10 having two surfaces that face toward opposite directions and two side portions that connect the two surfaces to each other, two bias field applying layers 12, 12 that are located adjacent to the side portions of the magnetoresistive element and apply a bias magnetic field to the magnetoresistive element, and two electrode layers 14, 14 that feed a current used for signal detection to the magnetoresistive element, each of the electrode layers being adjacent to one of surfaces of each of the bias field applying layers, wherein at least one of the electrode layers overlaps one of the surfaces of the magnetoresistive element the magnetoresistive element incorporates a nonmagnetic layer 20 having two surfaces that face toward opposite directions, a soft magnetic layer 18 adjacent to one of the surfaces of the nonmagnetic layer, a pinned layer 22, located adjacent to the other one of the surfaces of the nonmagnetic layer, whose direction of magnetization is fixed and an anti-ferromagnetic layer 16 located adjacent to one of surfaces of the pinned layer that is farther from the nonmagnetic layer,

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the anti-ferromagnetic layer 16 fixing the direction of magnetization of the pinned layer 22 (col. 7, lines 1-38).

Further, Nakamoto teaches the magnetoresistive device wherein the total length of regions of the two electrode layers that are laid over the one of the surfaces of the magnetoresistive element is smaller than  $0.3\mu\text{m}$  (see Figs. 7 & 14).

Nakamoto does not teach the pinned layer that includes a nonmagnetic spacer layer and two ferromagnetic layers that sandwich the spacer layer and have direction of magnetization fixed to opposite directions.

Gill teaches a magneto resistive sensor in Fig. 6, wherein the pinned layer 622 includes a nonmagnetic spacer layer 626 and two ferromagnetic layers 628, 624 that sandwich the spacer layer and have direction of magnetization fixed to opposite directions 629, 625.

It would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the Nakamoto magnetoresistive sensor having the pinned layer that includes a nonmagnetic spacer layer and two ferromagnetic layers that sandwich the spacer layer and have direction of magnetization fixed to opposite directions, in order to provide an sensor having a low intrinsic uniaxial anisotropy as taught by Gill (see col. 1, lines 20-21).

As to claims 3, 8, 13 and 18, Nakamoto teaches the magnetoresistive device, wherein both of the two-electrode layers overlap the one of the surfaces of the magneto resistive element. In FIGs. 7 & 14, the graphs show overlap values down to zero, so therefore would also encompass the claimed "smaller than  $0.15\mu\text{m}$ " limitation(s).

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As to claims 4, 9, 14 and 19, Nakamoto teaches the magnetoresistive device in FIG. 1, wherein the two bias field applying layers 12, 12 are located off one of the surfaces of the magnetoresistive element 10.

As to claims 5, 10, 15 and 20, Nakamoto teaches the magnetoresistive device, wherein a space between the two electrode layers is equal to or smaller than approximately 0.6um (see Fig. 5).

### ***Response to Amendment***

3. Applicant's arguments filed 6/30/03 have been fully considered but they are not persuasive.

A...Applicant asserts that “neither Nakamoto nor Gill, individually or in combination, disclose or suggest a magnetoresistive device including at least a total length of regions of two electrode layers that are laid over the one of the surfaces of a magnetoresistive element is smaller than 0.3um, as recited in independent claim 2, and similarly recited in independent claims 7, 12 and 17.” (emphasis added by applicant)

In response, after careful re-evaluation of the Nakamoto et al reference, while it is stated (at col. 10, lines 38-40) that “the overlap amount for the electrode 14 is *preferably* in the range between 0.25um and 2um.” (emphasis added by Examiner), the claimed value(s) of less than 0.30 um (combined overlap) or 0.15 um (each overlap) is still encompassed by the overall disclosure of the reference. Specifically, FIGs. 7 & 14 give output values for a range of overlap from 0.0 to 1.5 um which would encompass the aforementioned claimed range(s), and in doing so, still maintains a higher output than the “Prior Art” even with an overlap as small as 0.125 um (see

FIG. 14-second data point). Therefore, the rejection with respect to Nakamoto et al is maintained.

***Conclusion***

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

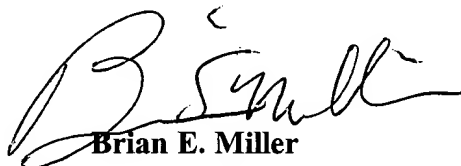
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian E. Miller whose telephone number is (703) 308-2850. The examiner can normally be reached on M-F 7:45am-5:15pm (FF off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (703) 305-9687. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4750.

A handwritten signature in black ink, appearing to read "B. E. Miller", written in a cursive style.

**Brian E. Miller**  
**Primary Examiner**  
**Art Unit 2652**

Bem  
10/06/03